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Johnson

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[45] **Date of Patent: Aug. 8, 1995**

[54] **WEATHERSTRIP ASSEMBLIES**

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[73] Assignee: **Ultrafab Inc.**, Farmington, N.Y.

[21] Appl. No.: **52,022**

[22] Filed: **Apr. 22, 1993**

[51] **Int. Cl.**[6] **E06B 7/16**
[52] **U.S. Cl.** **49/489.1**; 49/475.1
[58] **Field of Search** 49/489.1, 493.1, 475.1; 428/96

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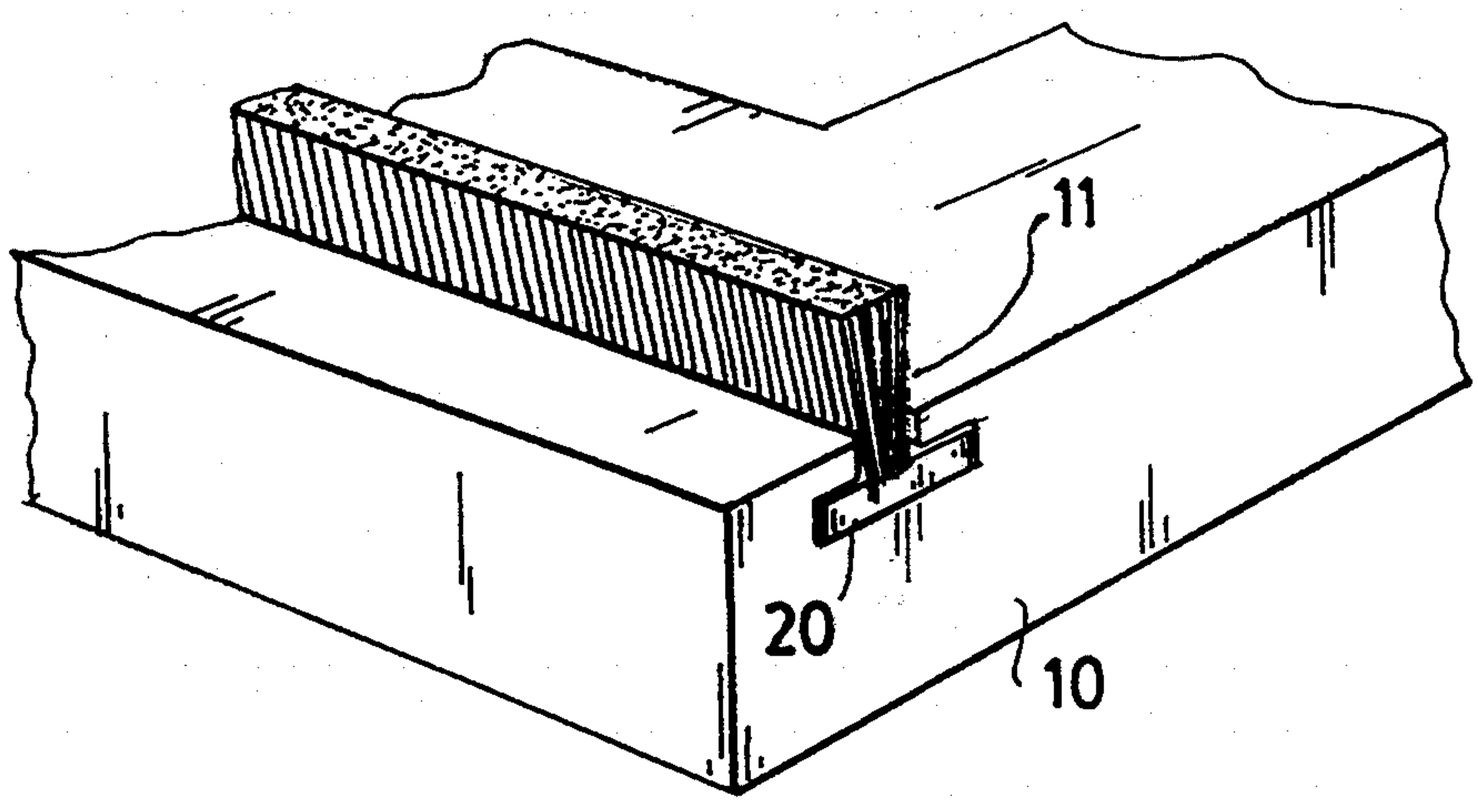
Primary Examiner—Peter M. Cuomo
Assistant Examiner—Jerry Redman
Attorney, Agent, or Firm—M. Lukacher

[57] **ABSTRACT**

A weatherstrip assembly has a backing strip **30** with one or more local interference members in the form such as of nubbins **40**A or alternative nubbins, which frictionally engage a channel or T-slot holding the backing member **30** and thereby restrict movement of the backing member **30** within the channel or T-slot, and especially movement of the weatherstrip along (longitudinally of) the length of the channel. Lateral (side to side) movement of weatherstrip is also restricted.

17 Claims, 3 Drawing Sheets



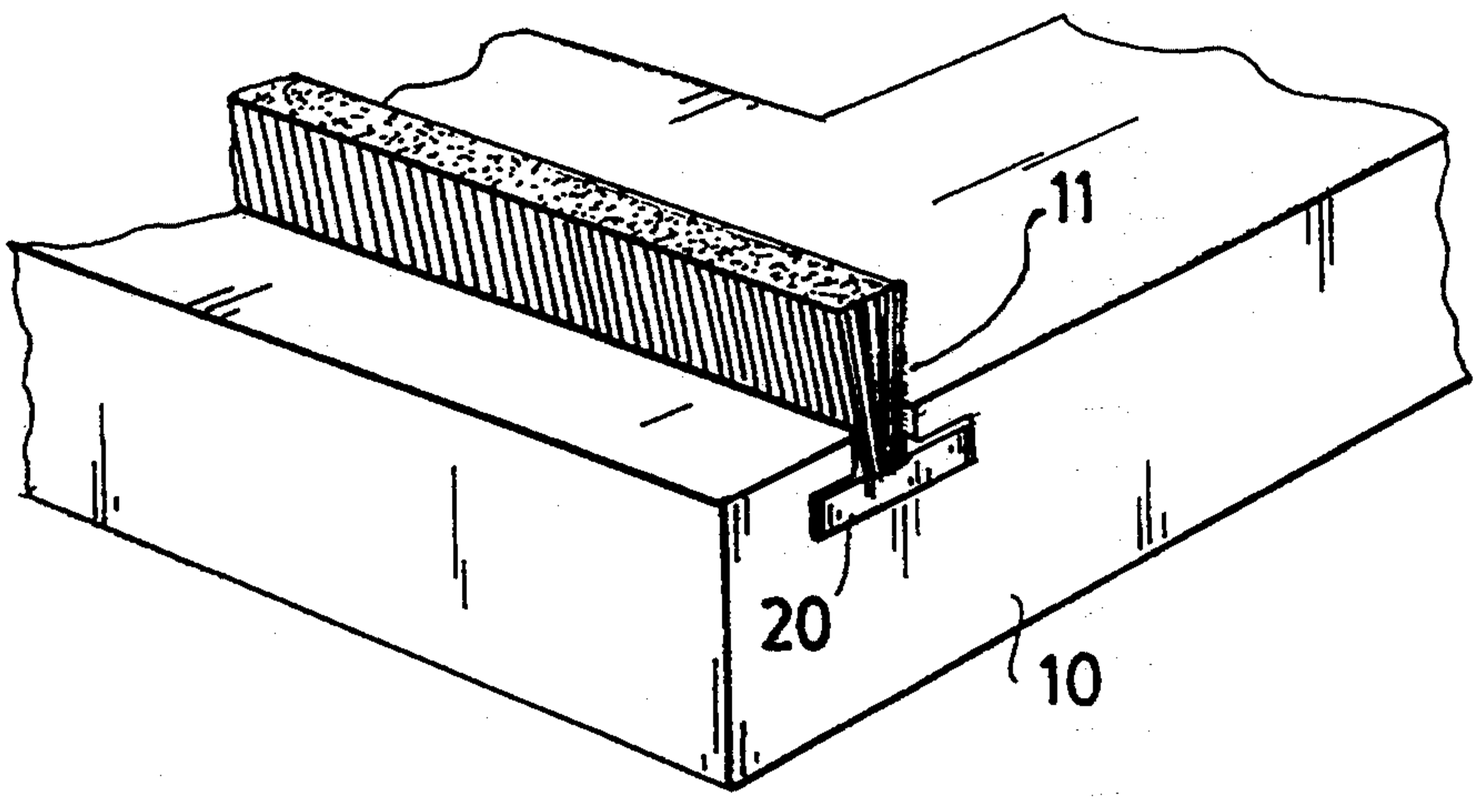


FIG. 1
PRIOR ART

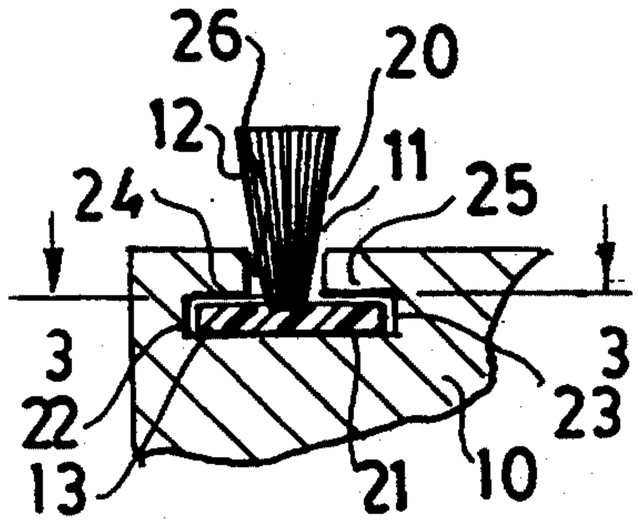


FIG. 2
PRIOR ART

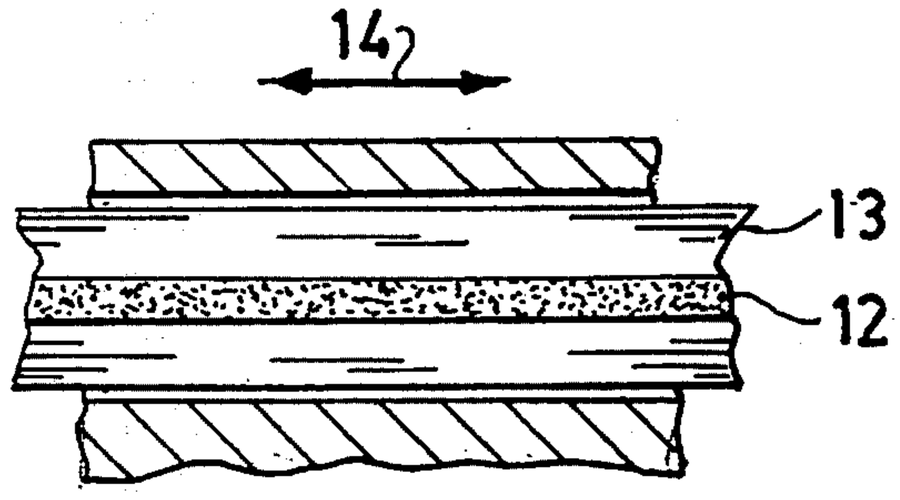


FIG. 3
PRIOR ART

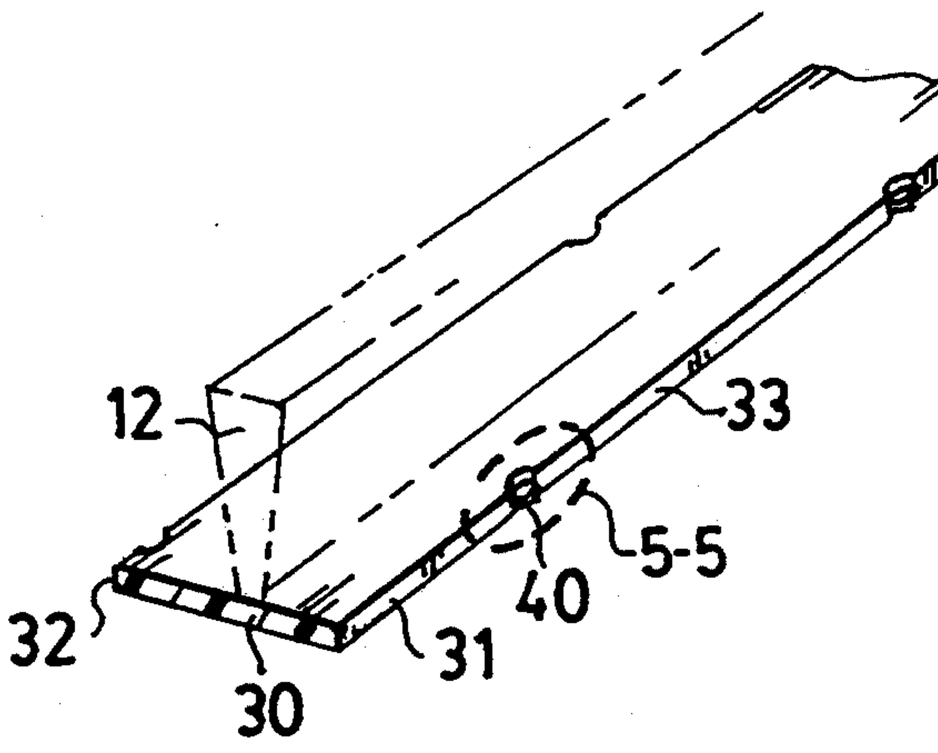


FIG. 4

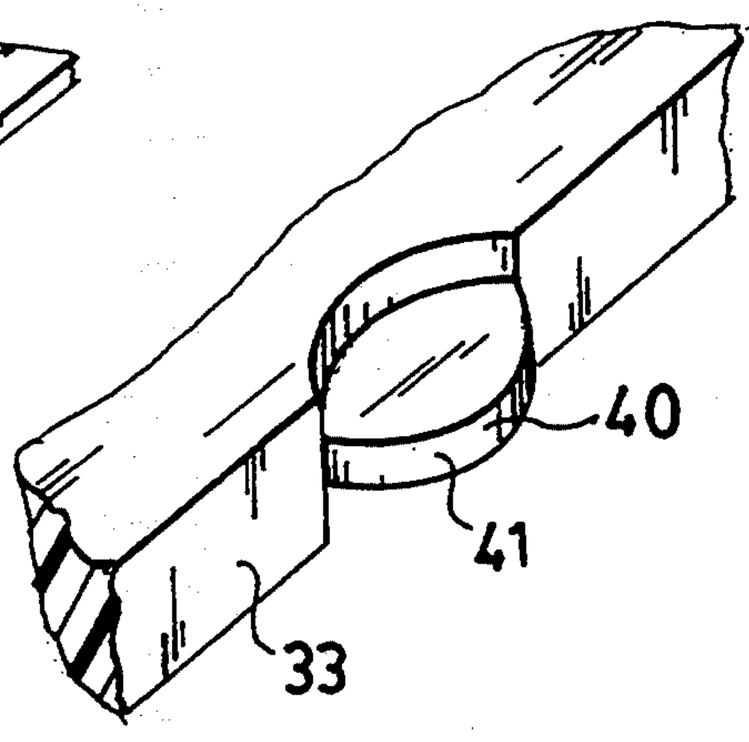
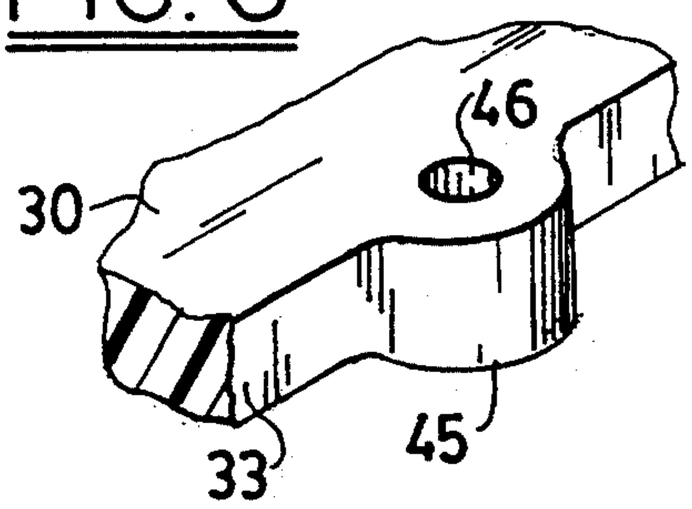


FIG. 5

FIG. 6



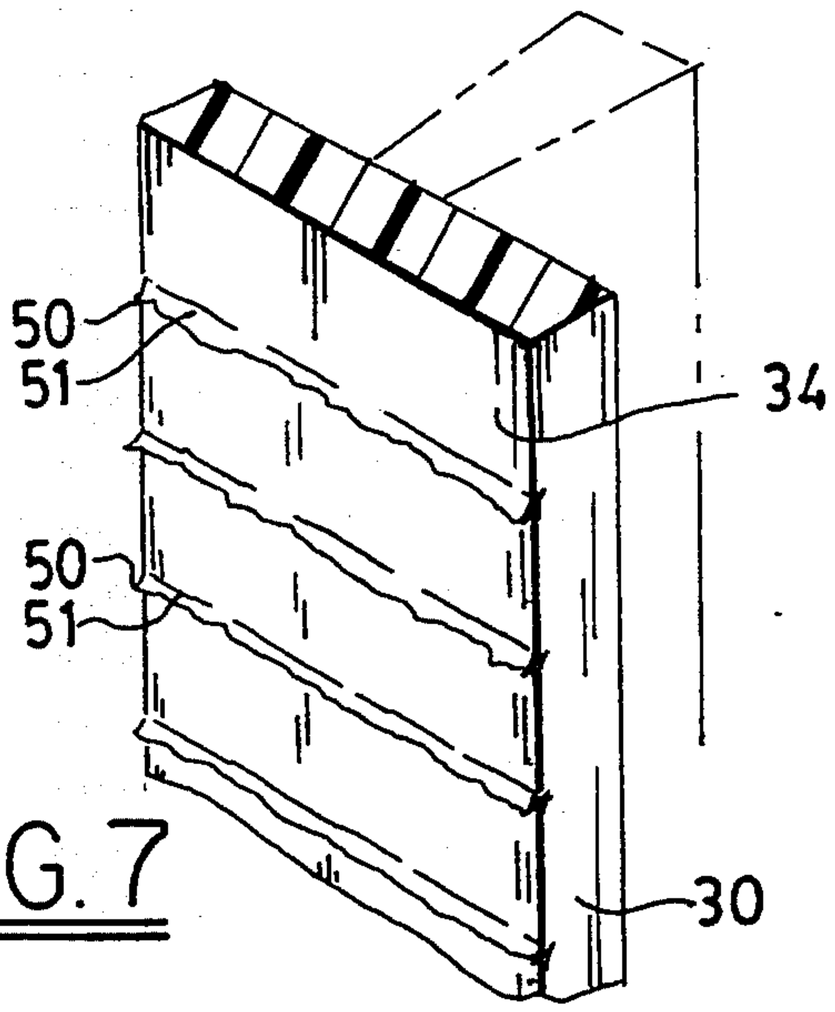


FIG. 7

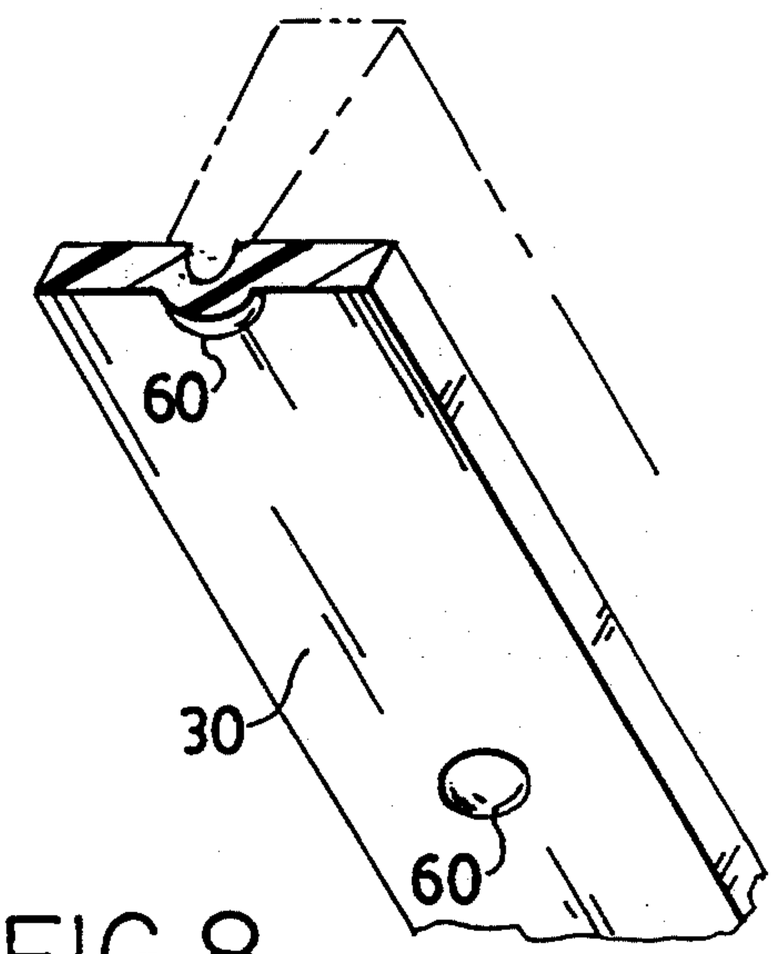


FIG. 8

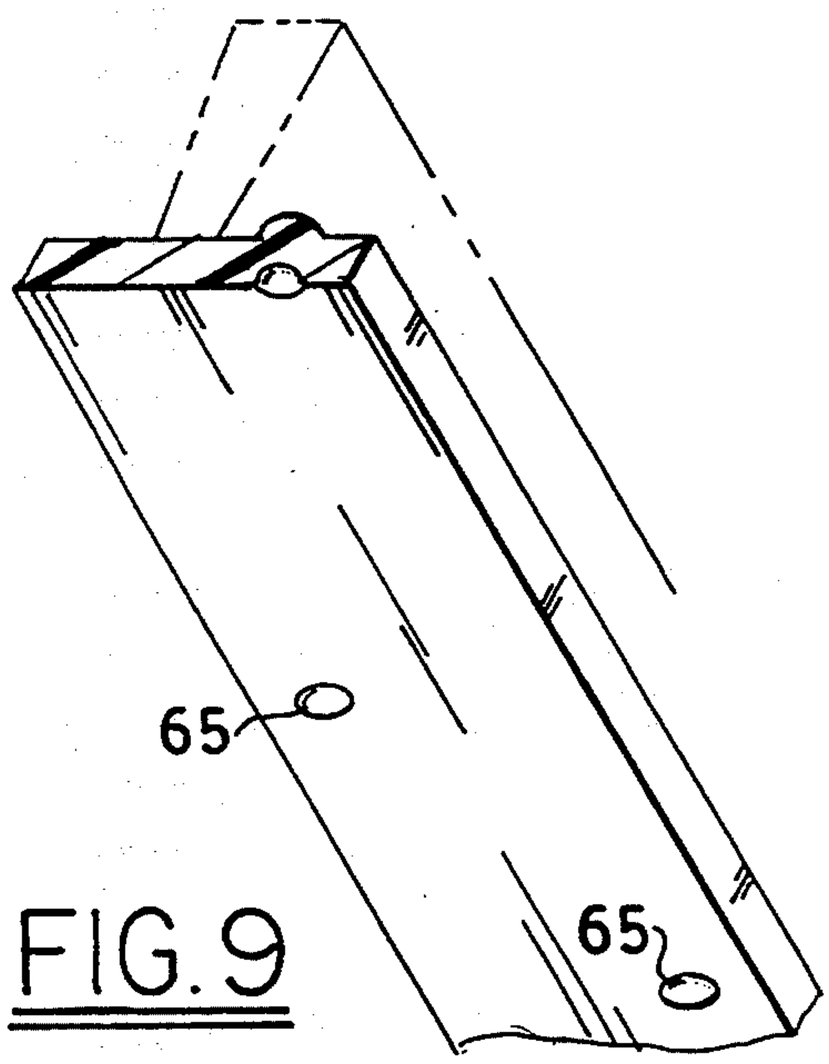


FIG. 9

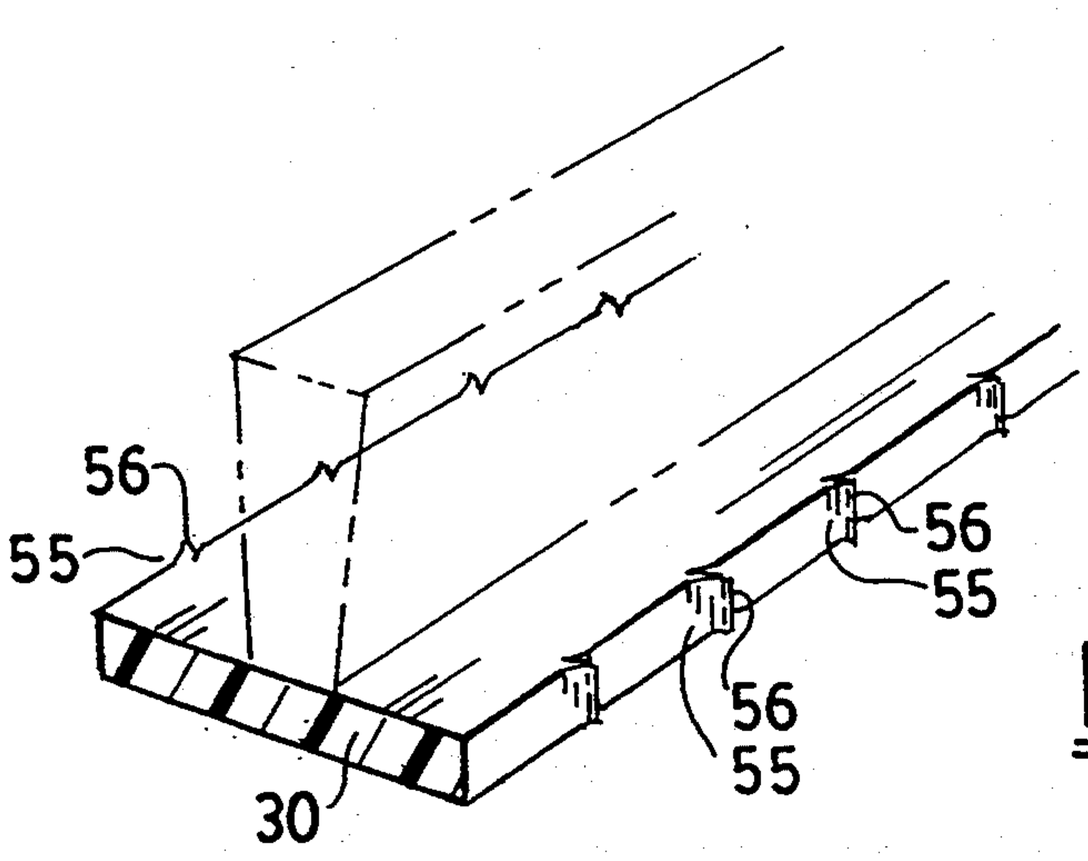
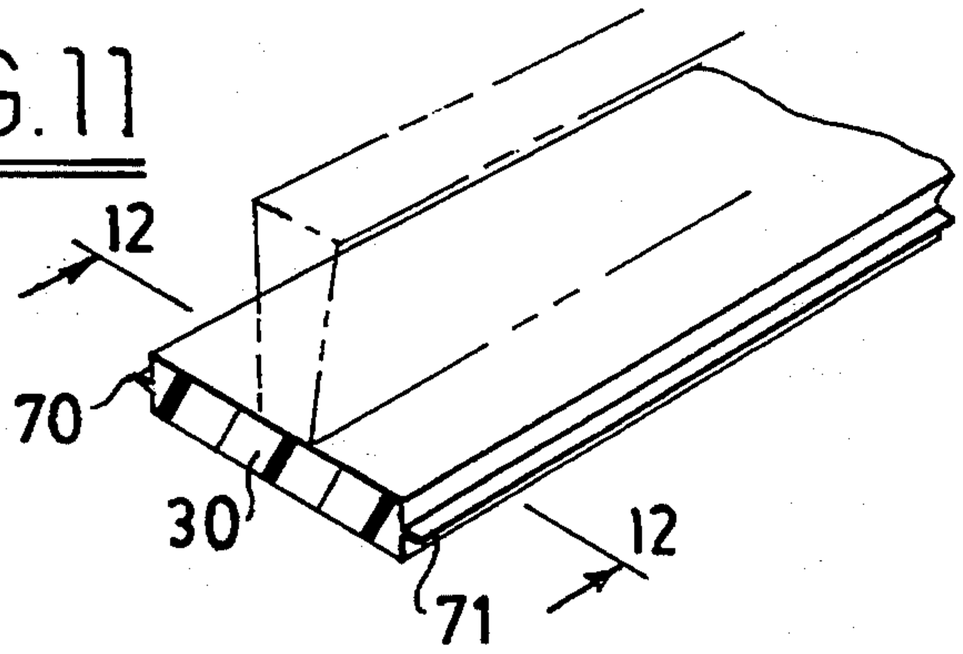


FIG. 10

FIG. 11



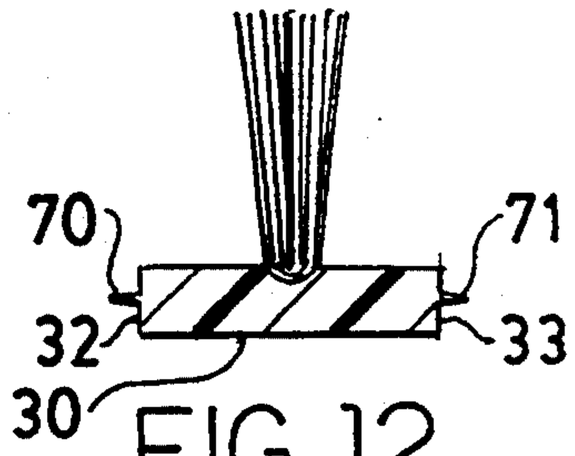


FIG. 12

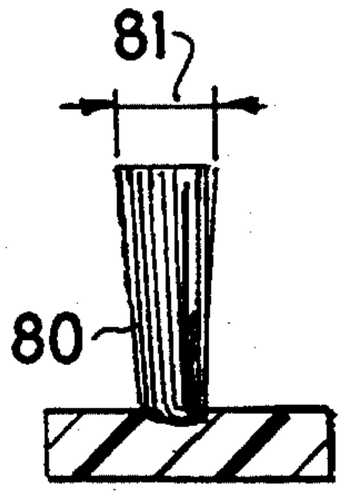


FIG. 13

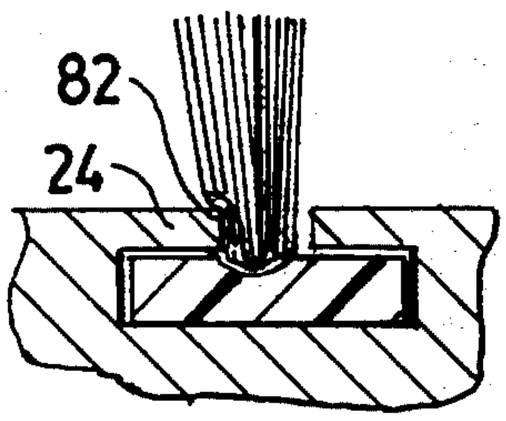


FIG. 14

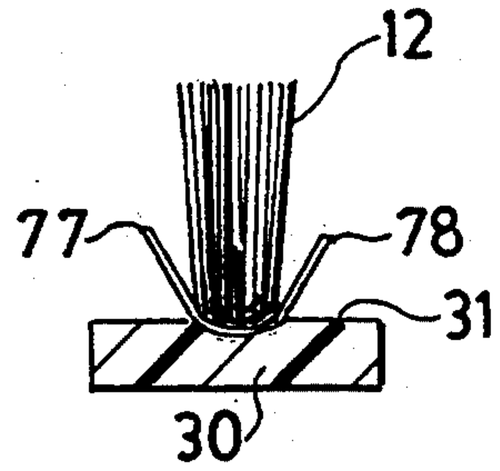


FIG. 15

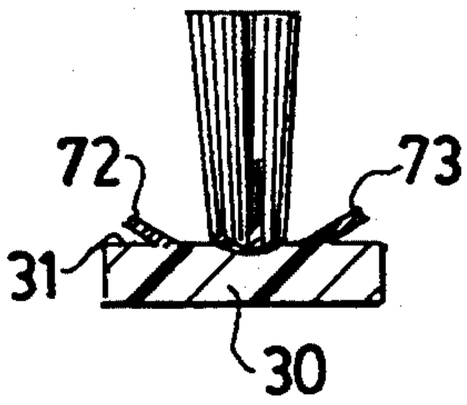


FIG. 16

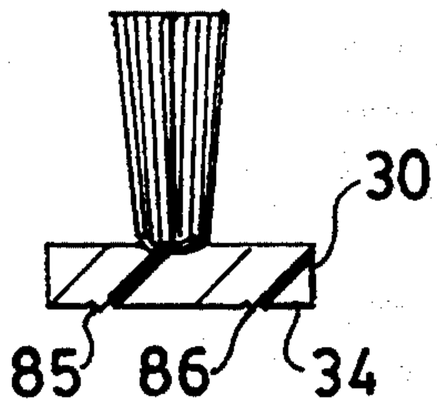


FIG. 17

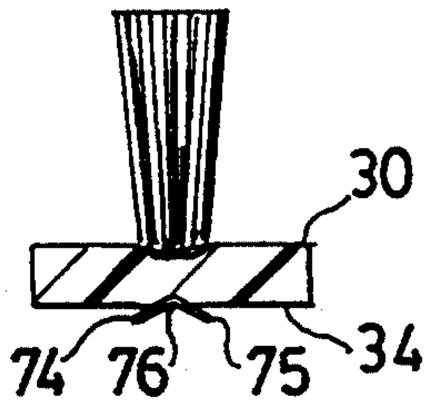


FIG. 18

WEATHERSTRIP ASSEMBLIES

BACKGROUND OF THE INVENTION

The present invention relates to weatherstrip assemblies, and, in particular, to weatherstrip assemblies which are used on windows and doors or other sash members.

The invention is suitable for use with prime windows or doors as well as storm windows and storm doors. Those skilled in the art will appreciate that the invention is useful for other weatherstripping purposes.

Weatherstripping acts as a barrier or seal against the elements and prevents wind, rain and other elements from passing into a structure. This prevention is achieved through the use of an impervious barrier in the weatherstrip. A typical approach to solving problem of mounting a weatherstrip on a window or door structure has been to provide a channel in the periphery of the structure and an insertable strip that is retained in the channel. Early examples of such strip and channel combinations are shown in U.S. Pat. Nos. 3,224,047 and 3,226,190. More recent attempts at solving this problem have relied upon a flexible weatherstrip that can be deformed in order to insert it into a channel defined by relatively rigid structural members. So, for example, in U.S. Pat. No. 3,690,038, there is a shown weatherstrip member C with a cavity D. The weatherstrip member C is of flexible material and flanges **18** and **20** can be manipulated to temporarily reduce the size of the cavity D so that the weatherstrip member C may be inserted into a slot **10**. Still others have provided lines of weakness along the backing strip member which can also assist in temporarily deforming the flexible weatherstrip or insertion into a T-slot. See, for example, U.S. Pat. No. 4,458,450.

However, such prior art assemblies do not provide efficient means for laterally restraining the backing member against movement within the T-slot. As such, the backing member is often free to move within the T-slot. Such motion may cause the backing member to gradually work its way out of the T-slot. The weatherstrip is then released thereby eliminating the barrier to the weather elements and thus defeating the whole purpose of the weatherstrip assembly.

SUMMARY OF THE INVENTION

It is a feature of this invention to provide an improved weatherstrip which restrains the motion of the backing strip thereby restoring movement of the weatherstrip.

It is a further feature of this invention to provide a weatherstrip assembly with a backing strip having one or more interference members that engage internal surface portions of the T-slot channel in order to restrict the longitudinal movement of the backing strip within the channel.

It is still another object of this invention to provide a backing strip with surface interference features that locally increase the external dimensions of the backing strip to thereby frictionally engage internal surface portions of the T-slot and thereby restrict the longitudinal movement of the backing strip within the T-slot.

It is another feature of this invention to provide an improved weatherstrip with discrete interference members which provide the desired result of retaining movement of the weatherstrip and to provide various equivalent or alternative means for obtaining that result, including nubbins, distortions, coined surfaces, fins, and extra wide pile fibers for locally interfering with portions of the T-slot and thereby restraining movement of the backing strip within the T-slot.

The movement of the weatherstrip which is restrained is primarily in a longitudinal direction, along the length of the slot, but lateral (side-to-side) movement is also restrained.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a partial perspective illustration of a weatherstrip of the prior art disposed in a T-slot channel of a window or door.

FIG. **2** is a partial cross-sectional area of a prior an weatherstrip assembly.

FIG. **3** is a partial top-view taken along plane **3—3** of FIG. **2**.

FIG. **4** is a partial perspective view of a weatherstrip member of the invention.

FIG. **5** is an expanded partial perspective view of the area **5—5** of FIG. **4**.

FIGS. **6–18** illustrate alternative embodiments of the invention.

DETAILED DESCRIPTION

With reference to FIG. **1**, there is shown a prior art weatherstrip assembly **11** disposed in a T-slot **20** of a window or door **10**. The problems associated with such prior art devices are best understood with reference to FIGS. **2** and **3**. There, the T-slot **20** is shown having a base **21**, a pair of walls **22, 23** spaced apart by the base **21** and extending vertically therefrom. A pair of lips **24, 25**, each extending from one of the opposite walls **22, 23** define an opening **26** in the channel **20**. The weatherstrip **11** includes a backing strip **13** and row of pile fibers **12** that extend through the opening **26**.

The lips **24, 25** serve to partially extend over the backing strip **13** and thereby retain the weatherstrip **11** and the T-slot **20**. However, problems have arisen with such prior art assemblies. One problem is that the weatherstrip **11** may move longitudinally within the T-slot as indicated by the arrows **14**. If the weatherstrip is in an open-end channel such as illustrated in FIG. **1**, it is possible that the weatherstrip, through vibration or other means including tampering or accident, may ultimately leave the T-slot **20** thereby permitting the intrusion of unwanted environmental elements including heat, cold, wind, rain, dust, etc.

The embodiments of the invention shown in FIGS. **4–18** overcome the problems of the prior art by providing a plurality of local interference members that engage one or more surfaces or portions of the T-slot in order to longitudinally restrain the motion of the weatherstrip, and, in particular, the backing strip inside the T-slot. One embodiment of the invention shown in FIGS. **4** and **5** rely upon a plurality of nubbins **40**. The backing strip **30** is made of flexible material, see e.g., Horton U.S. Pat. Nos. 3,175,256 and 4,148,953 for fabrication techniques. It has a row of pile fibers **12** longitudinally extending along an upper surface **31**. It also has a pair of edges **32, 33**. Along the edges there are disposed a plurality of nubbins **40**. With reference to FIG. **5**, one nubbin **40A** is shown in detail. The nubbin is formed by a suitable punching tool that compresses a portion of the material of the backing strip **30** along the edge **33** in order to form a circular, projecting surface **41** along the edge **33**. When the backing strip **30** with

nubbins **40** are inserted into a T-slot **20**, the nubbin surface **41**engages the inner surfaces of the sidewall **23** of T-slot **20**. This engagement of the sidewalls **22, 23** by the nubbins **40** establishes a restriction or restraint against the unwanted motion **14** within the T-slot **20**. Thus, the backing strip **30** of FIG. **4** remains relatively stationary within the T-slot **20**. The nubbins are spaced apart sufficiently so that the functional forces are sufficient to restrain longitudinal movement, but not so large as to prevent adjustment and removable for replacement (e.g., about 4" of art Nubbins on opposite sides (edges **32–38**) and offset so that a nubbin on one side is between (preferably equal distance from) a pair of spaced nubbins on the opposite side edge of the strip **30**.

As an alternate embodiment shown in FIG. **6**, the backing strip **30** is provided with a plurality of distortions **45** that project laterally from the edges **32, 33** of the backing strip **30**. These distortions **45** also have a circular or curved shape. They are provided by a suitable punch tool that operates on the backing strip **30** to provide a plurality of holes **46** along the edges **32, 33** of backing strip **30**. Like the nubbins **40**, the distortions **45** frictionally engage the sidewalls **22, 23** of the T-slot **20** and laterally restrain the movement of the backing strip **30** within the T-slot **20**.

In another embodiment of the invention depicted in FIGS. **7, 10** the backing strip **30** is laterally restrained by a plurality of abrasions. In FIG. **7**, the abrasions **50** are shown extending laterally across the width of the backing strip **30** and on the lower surface **34** thereof. These abrasions are formed by a suitable abrading tool that provides a slight cut in the lower surface **34** of backing strip **30** to provide an interference flaps **51**. The abrasion **50** or cut may be formed at any suitable angle. Some abrasions may be formed at different angles in order to provide flaps extending in different directions in order to prevent lateral motion in either direction. The spacing of the abrasions may, like the spacing of the nubbins provide just sufficient frictional force to restrict movement, but not to prevent advertent adjustment or removal of the weatherstrip.

An alternate embodiment of the abrasion technique is shown in FIG. **10**. There, the abrasions **55** are shown on the surface of the lateral edges **32, 33** of the backing strip **30** and each has a flap **56** that extends at an angle from edges **32, 33**. While the abrasions are all shown as cuts made at the same relative angle, those skilled in the art will appreciate that cuts may be made at different angles in order to provide flaps extending in different angular directions to thereby further restrict lateral motion in both directions within the T-slot **20**.

FIGS. **8** and **9** indicate still another form of discrete backing strip surface deformation. In FIG. **8** there is shown a plurality of hemispherically shaped dimples **60**. The dimples are shown extending longitudinally along the length of the backing strip **30** in a position generally equalidisinally spaced from the edges **32, 33** thereof. As an alternate embodiment, the dimples may be spaced toward the edges **32, 33** as shown by the dimple **65** in FIG. **9**. The dimple may be formed during manufacture of the backing strip **30** through use of a suitable extruding tool. The dimples may also be formed after manufacture by a suitable deformation tool.

Those skilled in the art will understand that the backing strip **30** is generally made of extruded material of a given durometer. Those skilled in the art also understand that materials of different durometers may be combined and simultaneously extruded in order to provide a composite backing strip having portions of different durometers. FIG. **11** shows an example of a backing strip **30** that has a pair of fins **70, 71**. The fins **70, 71** are extruded with the backing material **30** but are of a different durometer from the backing strip **30**. The fins, **70, 71** are of a softer or more flexible durometer than backing strip **30**. As shown in FIGS. **11, 12**, the fins **70, 71**extend respectively from edges **32, 33** of backing strip **30**. The fins **70, 71** provide a sufficient lateral engagement and restraining force against the opposite walls **22, 23** of the T-slot **20** in order to prevent the lateral motion of the backing strip **30** within the T-slot **20**.

Other embodiments having of a plurality of fins to bear against portions of the T-slot and restrain the motion of the backing strip **30** are variously shown in FIGS. **15–18**. In FIG. **15**, a pair of fins **77, 78**, preferably of a softer durometer than the backing strip **30** extend horizontally and vertically from the upper surface **31** of the backing strip **30**. The fins **77, 78** extend upwardly at an angle and engage the projecting lips **24, 25** of the T-slot **20** and thereby restrain the lateral motion of the backing strip within the T-slot **20**. A further feature of the embodiment of the invention in FIG. **15** is that the fin **77, 78** are formed together with the row of pile fibers **12**. This assembly of pile fibers **12** and fins **77, 78** are mounted on the backing strip **30**. While the fins **77, 78** are indicated as discrete members, those skilled in the art will appreciate that, as shown in FIG. **15**, it may be a single member which is suitably contoured to provide upwardly extending ends and a middle suitable for receiving attachment of a row of pile fibers **12**.

With references to FIG. **16**, a pair of fins **72, 73** are shown integral with the backing strip **30** and extending from the upper surface **31** thereof. They extend laterally and vertically and are designed to engage the lower surface of the projecting lips **24, 25** of the T-slot **20**.

FIG. **18** shows still another fin-type embodiment. There, a pair of fins **74, 75** joined at an apex **76** extend laterally and vertically from the lower surface **34** of the backing strip **30**. The fins **74, 75** engage the surface of the base **21** of the T-slot **20** thereby restraining the lateral motion of the backing strip **30** within the T-slot **20**.

FIG. **17** shows another embodiment of the invention where a pair of coined surfaces **85, 86** are disposed longitudinally along the lower surface **34** of backing strip **30**. The coined surfaces **85, 86** engage the surface of the base **21** in order to restrain the motion of the backing strip **30** within the T-slot **20**. Of course, in lieu of such coined surfaces, a pair of fins could also be provided along the length of the lower surface **34** to achieve a similar result.

Still another embodiment of the invention is illustrated in FIGS. **13, 14**. There, the lateral restraint interference members comprise the row of pile fibers **80** that are made of an extra wide width **81**. This row of pile fibers that is made extra wide so that the fibers engage the lips **24, 25** of the T-slot **20** and thereby restrain the motion of the backing strip **30** within the T-slot **20** as a result of the pinching of the wide pile **80** at the point **82** near the base of such row of pile fibers **80**.

In all of the embodiments the interference members are spaced or otherwise arranged that movement is restrained, but advertent adjustment and removal of the weatherstrip is allowed.

Having thus described the embodiments of the invention, those skilled in the art will appreciate that further additions, changes, modifications and alterations of the

preferred embodiments may be made without departing from the spirit and scope of the appended claims.

What I claim is:

1. A weatherstrip assembly comprising:

a) an elongated channel having a T-shaped cross-sectional area and an internal surface defined by a base and a pair of walls spaced apart from each other and extending vertically from said base and an opening opposite the base;

b) a pair of lips, each lip forming an end of a wall distal from the base and each projecting in a direction toward the other lip to define a reduced cross-sectional area at the opening of said channel;

c) a weatherstrip member comprising an elongated, flexible backing strip disposed in said channel, said backing strip having an upper surface facing said opening and a row of seal forming material extending along said upper surface and extending through said opening, said backing strip comprising an elongated member having a generally rectangular cross-sectional area and external dimensions generally slightly less than said channel; and

d) local interference members comprising a plurality of nubbins disposed along said backing strip for engaging the portions of the internal surface of said channel proximate said nubbins to restrict longitudinal movement of the weatherstrip member in the channel, while allowing for advertent movement and removal of the weatherstrip member.

2. The weatherstrip assembly of claim **1** wherein said nubbins are disposed along both edges of said backing strip.

3. The weatherstrip assembly of claim **1** wherein said nubbins comprise a plurality of edge distortions disposed along at least one edge of said backing strip.

4. The weatherstrip assembly of claim **3** wherein said edge distortions are formed by punching holes in said backing strip proximate an edge thereof to distort said strip and cause a portion of said strip to extend beyond the edge thereof.

5. The weatherstrip assembly of claim **3** wherein the edge distortions are disposed along both edges of said backing strip.

6. The weatherstrip assembly of claim **1** wherein said nubbins comprise a plurality of dimples having a hemispherical shape and disposed along the surface of the backing strip facing said base of said channel.

7. The weatherstrip assembly of claim **6** wherein the dimples are reverse cold formed in the backing strip.

8. The weatherstrip assembly of claim **6** wherein the dimples are generally disposed in the center of said backing strip lower surface.

9. The weatherstrip assembly of claim **8** wherein the dimples are generally disposed proximate opposite edges of said lower surface of said backing strip.

10. The weatherstrip assembly of claim **1** wherein said nubbins comprise a plurality of abrasions in said backing strip, said abrasions being principally transverse to said assembly and being formed by partial separations in the surface of said backing strip.

11. The weatherstrip assembly of claim **10** wherein the abrasions extend across the width of the lower surface of said backing strip for engaging the base of said channel.

12. The weatherstrip assembly of claim **10** wherein said abrasions are disposed along one or both edges of said backing strip for engaging one or both walls of said channel.

13. The weatherstrip assembly of claim **1** wherein a lower surface of the backing strip is provided with one or more coined ridges that are raised from and project vertically from said backing strip in order to engage the surface of the base of the T-slot.

14. A weatherstrip assembly comprising:

a) an elongated channel having a T-shaped cross-sectional area and an internal surface defined by a base and a pair of walls spaced apart from each other and extending vertically from said base and an opening opposite the base;

b) a pair of lips, each lip forming an end of a wall distal from the base and each projecting in a direction toward the other lip to define a reduced cross-sectional area at the opening of said channel;

c) a weatherstrip member comprising an elongated, flexible backing strip disposed in said channel, said backing strip having an upper surface facing said opening and a row of seal forming material extending along said upper surface and extending through said opening, said seal forming material being a row of fibrous pile; and

d) local interference members comprising the row of pile having a width sufficient to engage the projecting facing edges of the lips and of sufficient thickness to retain the backing strip in the channel and to restrict longitudinal movement of the weatherstrip member in the channel, while allowing for advertent movement and removal of the weatherstrip member.

15. A weatherstrip assembly comprising:

a) an elongated channel having a T-shaped cross-sectional area and an internal surface defined by a base and a pair of walls spaced apart from each other and extending vertically from said base and an opening opposite the base;

b) a pair of lips, each lip forming an end of a wall distal from the base and each projecting in a direction toward the other lip to define a reduced cross-sectional area at the opening of said channel;

c) a weatherstrip member comprising an elongated, flexible backing strip disposed in said channel, said backing strip having an upper surface facing said opening and a row of seal forming material extending along said upper surface and extending through said opening, said seal forming material being a row of fibrous pile; and

d) local interference members comprising a pair of fins extending from the surface of the backing strip and engaging the projecting surfaces of the lips to restrict longitudinal movement of the weatherstrip member in the channel, while allowing for advertent movement and removal of the weatherstrip member.

16. The weatherstrip assembly of claim **15** wherein the backing strip is of one durometer and the fins are of a different durometer.

17. The weatherstrip assembly of claim **16** wherein the durometer of the backing strip is harder than the durometer of the fins.

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